

Claims

What is claimed is:

1. An electrode for an electric energy-generating or -storing device, comprising:
a carbonyl aromatic polymer having at least one unit that contains at least one
cyclopentanone structure condensed with at least two aromatic rings.
2. The electrode of claim 1, wherein the carbonyl aromatic polymer is doped with an anion or cation.
- 10 3. The electrode of claim 1 further comprising a current collector.
4. The electrode of claim 1 further comprising an electroconductive agent.
- 15 5. The electrode of claim 1 further comprising a second electroconductive polymer.
6. The electrode of claim 1 further comprising a metal oxide.
- 20 7. The electrode of claim 1, wherein the carbonyl aromatic polymer comprises at least 20% by weight units having at least one cyclopentanone structure condensed with at least two aromatic rings.
8. The electrode of claim 1, wherein the electrode is a positive electrode.
- 25 9. The positive electrode of claim 8, wherein the carbonyl aromatic polymer is doped with an anion or cation.
10. The positive electrode of claim 8 further comprising a current collector.
11. The positive electrode of claim 8 further comprising an electroconductive agent.

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12. The positive electrode of claim 8 further comprising a metal oxide.
13. The positive electrode of claim 8 further comprising a second electroconductive polymer.
- 5 14. The positive electrode of claim 8, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.
- 10 15. The electrode of claim 1, wherein the electrode is a negative electrode.
16. The negative electrode of claim 15 further comprising a current collector.
17. The negative electrode of claim 15, wherein the carbonyl aromatic polymer is doped with a cation or anion.
- 15 18. The negative electrode of claim 15 further comprising an electroconductive agent.
19. The negative electrode of claim 15 further comprising a second electroconductive polymer.
- 20 20. The negative electrode of claim 15, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.
21. The electrode of claim 1, wherein the electric energy-generating or -storing device is a battery.
- 25 22. The electrode of claim 21, wherein the battery is a secondary battery.

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23. The electrode of claim 1, wherein the electric energy-generating or -storing device is a capacitor.

24. The electrode of claim 1, wherein the electric energy-generating or -storing device is a fuel cell.

25. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(9-fluorenone).

26. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(cyclopenta[def]fluorene-4,8-dione).

27. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(benzo[b]fluoren-11-one).

28. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(dibenzo[b,h]fluoren-12-one).

29. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(cyclopenta[def]phenanthren-4-one).

30. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(8H-cyclopenta[def]fluoren-4-one).

31. The electrode of claim 1, wherein the carbonyl aromatic polymer is poly(indeno[1,2-b]fluorene-6,12-dione).

5 32. An electric-generating or -storing device comprising:
at least one electrode, the electrode comprising a carbonyl aromatic polymer having at least
one unit that contains at least one cyclopentanone structure condensed with at least two
aromatic rings.

10 33. The electric energy-generating or -storing device of claim 32 further comprising an
electroconductive agent added to the carbonyl aromatic polymer.

15 34. The electric energy-generating or -storing device of claim 32 further comprising a second
electroconductive polymer added to the carbonyl aromatic polymer.

20 35. The electric energy-generating or -storing device of claim 32, further comprising a metal
oxide added to the carbonyl aromatic polymer.

25 36. The electric energy-generating or -storing device of claim 32, wherein the carbonyl aromatic
polymer comprises at least 20% by weight units of at least one cyclopentanone structure
condensed with at least two aromatic rings.

30 37. The electric energy-generating or -storing device of claim 32, wherein the electric energy-
generating or -storing device is a battery.

35 38. The electric energy-generating or -storing device of claim 37, wherein the battery is a
secondary battery.

40 39. The electric energy-generating or -storing device of claim 32, wherein the electric energy-
generating or -storing device is a capacitor.

45 40. The electric energy-generating or -storing device of claim 32, wherein the electric energy-
generating or -storing device is a fuel cell.

41. The electric energy-generating or -storing device of claim 32 further comprising a second electrode comprising a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

5 42. The electric energy-generating or -storing device of claim 32, wherein the electrode further comprises a current collector.

43. The electric energy-generating or -storing device of claim 32, wherein the electrode further comprises an electroconductive agent.

10 44. The electric energy-generating or -storing device of claim 41, wherein at least one of the two electrodes further comprises a second electroconductive polymer.

45. The electric energy-generating or -storing device of claim 41, wherein at least one of the two electrodes further comprises a metal oxide.

15 46. The electric energy-generating or -storing device of claim 41, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.

20 47. The electric energy-generating or -storing device of claim 41, wherein the electric energy-generating or -storing device is a battery.

25 48. The electric energy-generating or storing device of claim 47, wherein the battery is a secondary battery.

49. The electric energy-generating or -storing device of claim 41, wherein the electric energy-generating or -storing device is a capacitor.

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50. The electric energy-generating or -storing device of claim 41, wherein the electric energy-generating or -storing device is a fuel cell.

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51. A battery comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the positive electrode comprises a carbonyl aromatic polymer having
5 at least one unit that contains at least one cyclopentanone structure condensed with at least
two aromatic rings.

52. The battery of claim 51, wherein the battery is a secondary battery.

10 53. The battery of claim 51, wherein the positive electrode is doped with an anion.


54. The battery of claim 51, wherein the positive electrode is doped with a cation.

15 55. The battery of claim 51, wherein the positive electrode further comprises a current collector.


56. The battery of claim 51, wherein the positive electrode further comprises an
electroconductive agent.

20 57. The battery of claim 51, wherein the positive electrode further comprises a second
electroconductive polymer.

58. The battery of claim 51, wherein the positive electrode further comprises a metal oxide.

25 59. The battery of claim 51, wherein the carbonyl aromatic polymer comprises at least 20% by
weight units of at least one cyclopentanone structure condensed with at least two aromatic
rings.

60. A battery comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the negative electrode comprises a carbonyl aromatic polymer having
5 at least one unit that contains at least one cyclopentanone structure condensed with at least
two aromatic rings.

61. The battery of claim 60, wherein the battery is a secondary battery.

10 62. The battery of claim 60, wherein the negative electrode is doped with an anion.

63. The battery of claim 60, wherein the negative electrode is doped with a cation.

15 64. The battery of claim 60, wherein the negative electrode further comprises a current collector.

65. The battery of claim 60, wherein the negative electrode further comprises an
electroconductive agent.

20 66. The battery of claim 60, wherein the negative electrode further comprises a second
electroconductive polymer.

67. The battery of claim 60, wherein the carbonyl aromatic polymer comprises at least 20% by
weight units of at least one cyclopentanone structure condensed with at least two aromatic
rings.

68. A battery comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the positive electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings and the negative electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

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69. The battery of claim 68, wherein the battery is a secondary battery.

10 70. The battery of claim 68, wherein the negative electrode is doped with an anion.

15 71. The battery of claim 68, wherein the negative electrode is doped with a cation.

72. The battery of claim 68, wherein the positive electrode is doped with an anion.

16 73. The battery of claim 68, wherein the positive electrode is doped with a cation.

20 74. The battery of claim 68, wherein the positive electrode is doped with an anion and the negative electrode is doped with a cation.

75. The battery of claim 68, wherein at least one of the positive or negative electrodes further comprises a current collector.

25 76. The battery of claim 68, wherein at least one of the positive or negative electrodes further comprises an electroconductive agent.

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77. The battery of claim 68, wherein at least one of the positive or negative electrodes further comprises a second electroconductive polymer.

78. The battery of claim 68, wherein the positive electrode further comprises a metal oxide.

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79. The battery of claim 68, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.

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80. A capacitor comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the positive electrode comprises a carbonyl aromatic polymer having
5 at least one unit that contains at least one cyclopentanone structure condensed with at least
two aromatic rings.

81. The capacitor of claim 80, wherein the positive electrode further comprises a current
collector.

10 82. The capacitor of claim 80, wherein the positive electrode further comprises an
electroconductive agent.

15 83. The capacitor of claim 80, wherein the positive electrode further comprises a second
electroconductive polymer.

84. The capacitor of claim 80, wherein the positive electrode further comprises a metal oxide.

20 85. The capacitor of claim 80, wherein the carbonyl aromatic polymer comprises at least 20% by
weight units of at least one cyclopentanone structure condensed with at least two aromatic
rings.

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86. A capacitor comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the negative electrode comprises a carbonyl aromatic polymer having
5 at least one unit that contains at least one cyclopentanone structure condensed with at least
two aromatic rings.

87. The capacitor of claim 86, wherein the negative electrode further comprises a current
collector.

10 88. The capacitor of claim 86, wherein the negative electrode further comprises an
electroconductive agent.

15 89. The capacitor of claim 86, wherein the negative electrode further comprises a second
electroconductive polymer.

90. The capacitor of claim 86, wherein the carbonyl aromatic polymer comprises at least 20% by
weight units of at least one cyclopentanone structure condensed with at least two aromatic
rings.

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91. A capacitor comprising:
a positive electrode;
a negative electrode; and
an electrolyte, wherein the positive electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings and the negative electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

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92. The capacitor of claim 91, wherein at least one of the positive or negative electrodes further comprises a current collector.

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93. The capacitor of claim 91, wherein at least one of the positive or negative electrodes further comprises an electroconductive agent.

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94. The capacitor of claim 91, wherein at least one of the positive or negative electrodes further comprises a second electroconductive polymer.

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95. The capacitor of claim 91, wherein the positive electrode further comprises a metal oxide.

96. The capacitor of claim 91, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.

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97. A fuel cell comprising:
an air electrode;
a fuel electrode; and
an electrolyte, wherein the air electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

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98. The fuel cell of claim 97, wherein the air electrode further comprises an electroconductive agent.

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99. The fuel cell of claim 97, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.

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100. A fuel cell comprising:
an air electrode;
a fuel electrode; and
an electrolyte, wherein the fuel electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

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101. The fuel cell of claim 100, wherein the fuel electrode further comprises an electroconductive agent.

102. The fuel cell of claim 100, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.

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103. A fuel cell comprising:
an air electrode;
a fuel electrode; and
an electrolyte, wherein the air electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings and the fuel electrode comprises a carbonyl aromatic polymer having at least one unit that contains at least one cyclopentanone structure condensed with at least two aromatic rings.

10 104. The fuel cell of claim 103, wherein at least one of the positive or negative electrodes further comprises an electroconductive agent.

15 105. The fuel cell of claim 103, wherein the carbonyl aromatic polymer comprises at least 20% by weight units of at least one cyclopentanone structure condensed with at least two aromatic rings.